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From: Platnick, Steven E. (GSFC-6100) <steven.e.platnick@nasa.gov>

To: Patricia Giles patricia.a.giles@nasa.gov

Conversation: AGU abstract

ABSTRACT FINAL ID: A43F-04;

TITLE: Reconciling simulated and observed views of clouds: MODIS, ISCCP, and the limits of instrument simulators in climate models

SESSION TYPE: Oral

SESSION TITLE: A43F. Advances in Research With Simulated Remote Sensing Measurements of Aerosol, Cloud, and Precipitation II

AUTHORS (FIRST NAME, LAST NAME): Robert Pincus¹, Steven E Platnick², Steve Ackerman³, Richard Hemler⁴, Patrick Hofmann¹

INSTITUTIONS (ALL): 1. University of Colorado, Boulder, CO, United States.

2. Earth Sciences Division, NASA/GSFC, Greenbelt, MD, United States.

3. University of Wisconsin, Madison, WI, United States.

4. NOAA/GFDL, Princeton, NJ, United States.

Title of Team:

ABSTRACT BODY: The properties of clouds that may be observed by satellite instruments, such as optical depth and cloud top pressure, are only loosely related to the way clouds are represented in models of the atmosphere. One way to bridge this gap is through "instrument simulators," diagnostic tools that map the model representation to synthetic observations so that differences between simulator output and observations can be interpreted unambiguously as model error. But simulators may themselves be restricted by limited information available from the host model or by internal assumptions.

This work examines the extent to which instrument simulators are able to capture essential differences between MODIS and ISCCP, two similar but independent estimates of cloud properties. We focus on the stark differences between MODIS and ISCCP observations of total cloudiness and the distribution of cloud optical thickness can be traced to different approaches to marginal pixels, which MODIS excludes and ISCCP treats as homogeneous. These pixels, which likely contain broken clouds, cover about 15% of the planet and contain almost all of the optically thinnest clouds observed by either instrument. Instrument simulators can not reproduce these differences because the host model does not consider unresolved spatial scales and so can not produce broken pixels. Nonetheless, MODIS and ISCCP observation are consistent for all but the optically-thinnest clouds, and models can be robustly evaluated using instrument simulators by excluding ambiguous observations.

<http://www.esrl.noaa.gov/psd/people/robert.pincus/Papers/Preprints/MODIS-for-Climate-Model-Eval.pdf>

KEYWORDS: [0550] COMPUTATIONAL GEOPHYSICS / Model verification and validation, [1640] GLOBAL CHANGE / Remote sensing.

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SPONSOR NAME: Robert Pincus

Additional Details

Previously Presented Material:

Contact Details

CONTACT (NAME ONLY): Robert Pincus

CONTACT (E-MAIL ONLY): robert.pincus@noaa.gov